



Faculty of Resource Science and Technology

**INSECT-EATING CULTURE AMONG THE BIDAYUH  
COMMUNITY OF SARAWAK**

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SARAWAK

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This project is submitted in partial fulfillment of the requirements for the degree of  
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### **Declaration**

No portion of the work referred to in this dissertation has been submitted in support of an application for other degrees of qualification of this or any other university or institution of higher learning.

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# Insect-Eating Culture among Bidayuh Community of Sarawak

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## ABSTRACT

A survey carried out on insect-eating culture among the Bidayuh community in the rural areas of Kuching and Samarahan Divisions revealed four insect species most popular among the people are the larvae of palm weevil or sago grub, *Rhynchophorus ferrugineus* and *Rhynchophorus schach* (Order Coleoptera: Family Curculionidae), adults of grasshopper, *Patanga succincta* (Order Orthoptera: Family Acrididae), adults and eggs of red ant, *Oecophylla smaragdina* (Fabr) (Order Hymenoptera: Family Formicidae) and adults of beetle, *Exopholis borneensis* (Order Coleoptera: Family Scarabaeidae). Bidayuh people from age group 40 years and above like the sago grub most. The practice of entomophagy among the Bidayuh community of Sarawak showed a declining trend, especially among the younger generations due to social change in the living style and availability of other food stuffs.

**Key words:** Insect eating culture, Bidayuh community, rural areas, interviewed

## ABSTRAK

Kajian memakan serangga di kalangan masyarakat Bidayuh di kawasan pedalaman di Bahagian Kuching dan Samarahan menunjukkan empat jenis serangga yang terkenal di kalangan penduduk Bidayuh. Antaranya adalah, ulat sago atau dikenali juga sebagai ulat mulong, *Rhynchophorus ferrugineus* dan *Rhynchophorus schach* (Ord. Coleoptera: Fam. Curculionidae), belalang, *Patanga succincta* (Ord. Orthoptera: Fam. Acrididae), dewasa dan telur semut merah, *Oecophylla smaragdina* (Fabr) (Ord. Hymenoptera: Fam. Formicidae), dan kumbang, *Exopholis borneensis* (Ord. Coleoptera: Fam. Scarabaeidae). Kebanyakan masyarakat Bidayuh, khasnya yang berumur 40 tahun ke atas paling menggemari ulat sago. Amalan memakan serangga di kalangan masyarakat Bidayuh Sarawak menunjukkan pola yang menurun, terutama di kalangan generasi muda disebabkan perubahan corak hidup dan kemudahan mendapat berbagai jenis makanan lain.

**Kata kunci:** Budaya makan serangga, penduduk Bidayuh, kawasan pedalaman, temuramah

## 1.0 Introduction

Edible insect are consumed by many people around the world because of their superior nutritional content (Lyon, 1996; Cherry, 1993). Ponzetta and Paoletti, (1997) stated that insects hunting are common cultures among many natives of the world because they provide important source of nutrition. This is true for both contemporary and early humans. Insects are consumed by people all over the world because they are rich natural protein source besides being low in cholesterol and fat (Bircz, 2002). Insect eating is known as entomophagy (Traub, 2001; Bircz, 2002) and is common custom practice among non-industrialized regions of the world (Philips and Burkholder, 1995; Willy, 2000). According to Defoliart (1992) insects normally is taken as a planned part of the diet throughout the year and when seasonally available. Furthermore, some insects found very favorable compared to the other food item (DeFoliart, 1989).

According to Bircz (2002) eating insects are popular among the indigenous peoples around the world which are from different regions and cultures including Africa, Australia, Asia, Mexico, and South America, so much so that insect has become part of their daily diet as insects are inexpensive compared to vertebrate meat in many developing countries. However, not all the insects' species are edible because some can cause allergy and some others are toxic to human (Lyon, 1996). According to Willy (2000), there are 1462 species of insect recorded as an edible species. Some of the most important insects that have been used as human food in non-European cultures are including grasshopper, caterpillars, beetle grubs and adult, winged

termites, bees, wasps and ant broods ( larvae and pupae) as well as winged ants, and cicadas (Defoliart, 1992).

As the world population increases and land for food production decreases the world may face food shortages in the next century. Thus, insects can be taken as one of daily nutritional source (Ramos-Elorduy, 1998). This is because insects provide highly quality protein and nutrient such as iron, calcium, and B vitamins (Willy, 2000). Willy (2000) also stated that eating insects can avoid people a much higher chance of getting disease than animals' meat. Nowadays, people can found insects sold widely in many of the urban restaurants and market (Defoliart, 1992). In Japan, several insects are sold and processed commercially (Mitsubishi, 1984; Kantha, 1988).

Normally, insects are easy to rear and harvest, and are widely distributed. According to Hill and Abang (2005) there are about 2 – 5 million species of insects in the world which can be found in the terrestrial and freshwater habitats. Many insects are beneficial to human not only as a food source but also as crop and flower pollinators. Some of them also produce silk and honey (Hill and Abang, 2005). According to Cherry (1991); Cherry (1993) insects nowadays is used in medical important and also as part of cultural beliefs among Australian aborigines. Generally, edible insects are abundant, nutritional, marketable, and economically valuable (Fromme, 2005).

The Bidayuh community, in which this study is going to be carried out, are mainly found in Kuching and Samarahan Divisions of Sarawak, mainly in Kuching, Serian,

Bau and Lundu districts. According to King (1993) Bidayuh is one of the 'Dayak' people that are normally categorized as the native people of Borneo. He also stated that Bidayuh is known as 'Land Dayak' which can be found widely at the western part of Sarawak. They generally do traditional farming practice, shifting cultivation of hill paddy and hunting. They frequently face difficulties in getting food. Therefore, some of them resort to eating insects. This culture has been practiced among the Bidayuh community since the early period. How far this tradition continues is part of the objective of this study to uncover.

The main objectives of this research project are to study insect-eating culture among the Bidayuh community of Sarawak. This would includes insect species eaten, frequency of intake, the stage of insect development eaten, the reasons for eating insect, and the practice of eating insect among different age groups and gender.

## **2.0 Literature Review**

Insects are well-known as an economic source of high quality protein among people around the world (Martin *et al.*, 1996; Defoliart *et al.*, 1982; Redford & Dorea, 1984). According to Krajck (1994) the analyses of Mexican and African food showed that the proteins of insects contain more calories than soybean and meat. Mean while, some people in western world viewed insects as a culinary curiosity and usually consider them as their last choice of food source to take. In Thailand, there are 7 - 19% of indigenous insects are consumed by the local people during the dry season which is from February – April (Pasamai-Eg-Kantrong & Orapin-Banjong, 1999).



According to Bodenheimer (1951) some insects had been important sources of human nutrition among people in Africa, Asia, and Latin America. Insects are very important as a source of protein among Africans especially their children because they are easily getting kwashiorkor (Leclercq, 1969).

According to Domoguen (1980) a survey conducted by an entomologist of the Mountain State Agriculture College (MSAC) found that the habit of eating insects among minority tribes of North Luzon in Philippines is an old tradition not only as one of their food source but also as a way to reduce the pests which destroy their crops. Mean while, the aborigines of Australian take insects as part of their diet (Clausen, 1954; Cherry, 1991). Insects are also very popular because they are in abundance and are easily available (Traub, 2001). For example, the edible mumpa or the caterpillar of an emperor moth from Family Saturniidae is providing a highly lucrative market and are indirectly much reward as food (Gullan & Cranston, 1994). According to Gullan & Cranston (1994), the caterpillar contains 60 – 70% protein of dry weight.

In Africa the winged termites, which provide important protein, fat, and vitamins, are enthusiastically collected at the end of the dry season by the people whose are faced with scarcity of food source because they emerge in great numbers. Besides termites, grasshoppers are also widely eaten all over the world including among the American Indians and Southeast Asians because they provide as much protein as animal meat (Anon, 2006). In Mexico fried grasshopper are canned commercially and are sold in supermarkets and local grocery stores (Bircz, 2002). Cicadas are also popularly eaten

among the tribes in New Guinea, Australia, Indochina and American Indians and become their staple protein source. Additionally, the larvae of the honey bee are eaten by people in numerous parts of the world (Turpin, 1994). In Thailand, silkworms, grasshoppers, and water bugs are sold by the pound in open-air markets (Molt, 2004).

Insect eating has been integrated into many cultures in Asia (Howard *et al.*, 2001). In Philippines, insects are becoming a daily food for peoples of northern Luzon who live in the highlands and poverty prevents them from buying exorbitantly priced meat and fish. Insects provide them with protein and other nutrients that they need (Domoguen, 1980). *Oecophylla smaragdina* (Fabr) or red ant from Family Formicidae is taken as a condiment food by the Dayaks in Borneo (Beccari, 1904) while in Myanmar, the red ant is usually consumed by women as it is good for menstruation (Maxwell-Lefroy, 1971). According to Turpin & McCann (1994) giant waterbugs is frequently consumed and also marketable in Southeast Asia.

In Malaysia, some of the large species of stick insects are eaten after removing their legs and wings (Kevan, 1991). While, in Vietnam adult *Oxya velox* (Fabr) or known as short-horned grasshopper (Fam. Acrididae) are usually eaten in quantity and are found in large numbers in May – December (Nguyen-Cong-Tien, 1928). The adults of *Oxya velox* (Fabr) are also widely consumed by people throughout the Philippines (Starr, 1991). According to Ghosh (1924) the pupa of large dung beetle, *Helicopriss bucephalus*, emerge in abundance around March to May and are popular among the Shans, one of the natives of Myanmar.

According to Chung *et al.* (2003) the larvae of snout beetle or weevil, *Rhynchophorus ferrugineus* (Ord. Coleoptera, Fam. Curculionidae) is the most common edible insects consumed by local people in Sabah and Sarawak (West Malaysia). In Malay words, the sago grub is called ulat sago (Meccer, 1993) which is collected from the sago trunk and coconut palm that have been left to decay for about two or three month after being felled. The egg of stick insect, *Haaniella grayi grayi* (Bragg, 1990) and larvae of long horned beetles, *Hoplocerambyx spinicornis* (Fam. Cerambycidae) (Mercer, 1993) are commonly eaten by local people in Sarawak. In Peninsular Malaysia the natives prefer giant forest ant, *Camponotus gigas*, because it contains high concentration of formic acid (Chung *et al.*, 2003).

### **3.0 Materials and Methods**

#### **3.1 Study area**

Surveys on insect-eating culture among the Bidayuh communities in Kuching and Samarahan divisions of Sarawak were conducted in selected four areas, Bau, Lundu, Serian, and Padawan.

Bau and Lundu are located 40 and 60 kilometres north of Kuching, while Serian and Padawan 75 and 90 kilometres west of Kuching town. In Bau area, the survey covered 5 villages which are Kpg. Gumbang, Kpg. Opar, Kpg. Pangkalan Tebang, Kpg. Serasot, and Kpg. Segubang. In Lundu area, interviews were conducted at Kpg. Raso 1, Kpg Raso 2, Kpg. Selampit, Kpg. Stungkor and Kpg. Bokah. While, in Serian area, they were conducted in Kpg. Tebekang Dayak, Kpg. Tae, Kpg. Engkeroh, Kpg.



Bunga, and Kpg. Lancang. In Padawan area, the survey were includes in Kpg. Bawang, Kpg. Kuap, Kpg. Potag, Kpg. Donu, and Kpg. Sidunuk (Appendix 3).



Figure 1: Map of Bidayuh community within the four study areas in Sarawak, Malaysia.

**3.2 Field Methodology**

Relevant informations and data to estimate the occurance of entomophagy among the Bidayuh community were obtained by mean of: (i) interviewing local Bidayuh communities, (ii) market survey, and (iii) published articles. Twenty respondents were interviewed in each village within the study area. In this survey, two sets of data from two different groups of people were collected. Twelve respondents were chosen randomly while the other eight respondents were selectively choosen. Twelve respondents from three different age groups were choosen for interview from each study area.



In another approach eight respondents were randomly selected among the insect-eating adults to find out insect species they eat and prefer and their sources. Personal interviews conducted following prepared questionnaires (Appendix 4) to reduce biasness and similar questions were asked to all respondents. The primary advantage of the personal interviews was that the people always respond when met in person and the interviewer can note specific reactions and eliminate misunderstanding among the people about the questions asked (Scheaffer *et al.*, 1990). Market survey helped to identify common or popular species and species of commercial value. Additional data were collected from published articles in journals, books, newsletters, and from published and unpublished reports.

### **3.3 Data Analysis (Statistical Methodology)**

The data were analyzed by using Kruskal-Wallis Test.

Hypothesis 1

H<sub>0</sub>: There is no significant different between four study areas

H<sub>A</sub>: There is significant different between four study areas

Hypothesis 2

H<sub>0</sub>: There is no significant different between three age groups

H<sub>A</sub>: There is significant different between three age groups

Hypothesis 3

H<sub>0</sub>: There is no significant different between male and female of Bidayuh people in term of entomophagy

H<sub>A</sub>: There is significant different between male and female of Bidayuh people in term of entomophagy

4.0 Results

Entomophagy does occur among the Bidayuh community of Sarawak. Figure 2, shows the types (species) of insect eaten among the Bidayuh people in the rural areas of Sarawak. Sago grubs, *Rhynchophorus ferrugineus* and *Rhynchophorus schach* are the most popular as alternative source of protein, followed by the adults of grasshopper, *Patanga succincta* and Red ants, *Oecophylla smaragdina*. Adults of beetle, *Exopholis borneensis* are also consumed but less frequently and by less number of people.

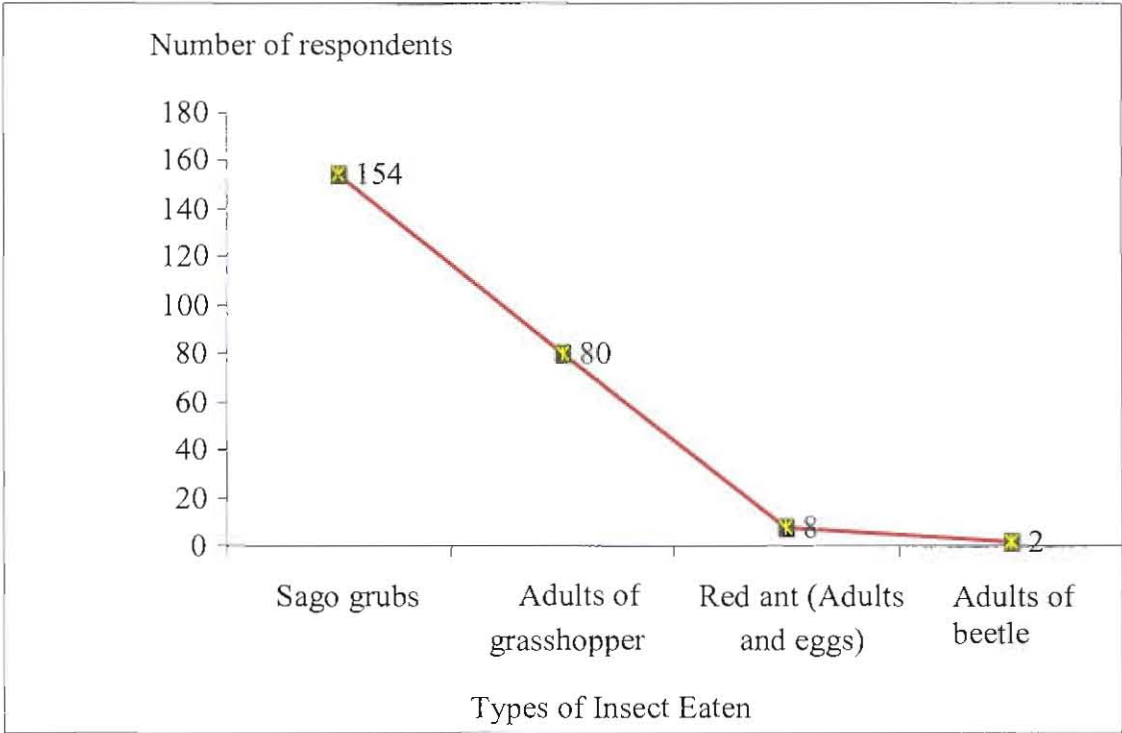


Figure 2: Type of insect eaten among the Bidayuh people of Sarawak.

Table I and Figure 3 clearly show that entomophagy in Serian area are the highest among the Bidayuh community. However, from the Kruskal-Wallis Test, we have

enough evidence to accept the null hypothesis 1 ( $p > 0.05$ ,  $df = 3$ ) (Appendix 5: Table 6) that there is no significant difference in entomophagy between the four study areas. This suggests that insect-eating culture is common and widespread among the Bidayuh community of the four surveyed areas.

Table1: Entomophagy among different age groups of the Bidayuh community in the four study areas.

Age group (Years old)	40 above		39 - 18		17 - 7		
District/Gender	♂	♀	♂	♀	♂	♀	Total
Bau	7	7	10	3	3	4	34
Lundu	9	6	8	4	4	1	32
Serian	10	10	10	5	9	4	48
Padawan	8	9	8	7	3	4	39
Total	34	32	36	19	19	13	
Grand Total	66		55		32		

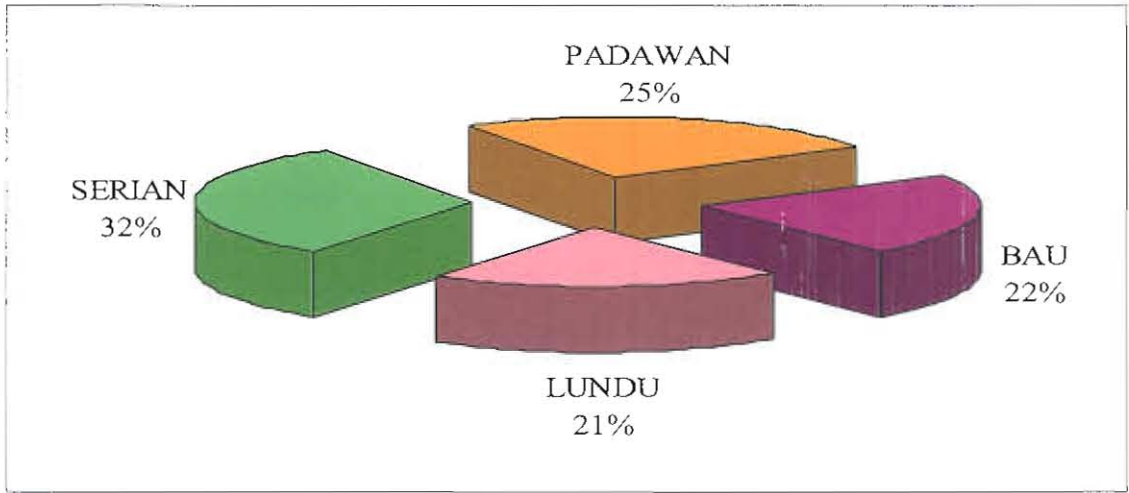


Figure 3: Percentage of entomophagy among the Bidayuh community in four study areas

Insect-eating shows a declining trend among the Bidayuh people, especially among the younger generations (Figure 4). The figure shows a constant decline from the older to the younger generations, thus rejecting the null hypothesis 2 (Appendix 5: Table 7).

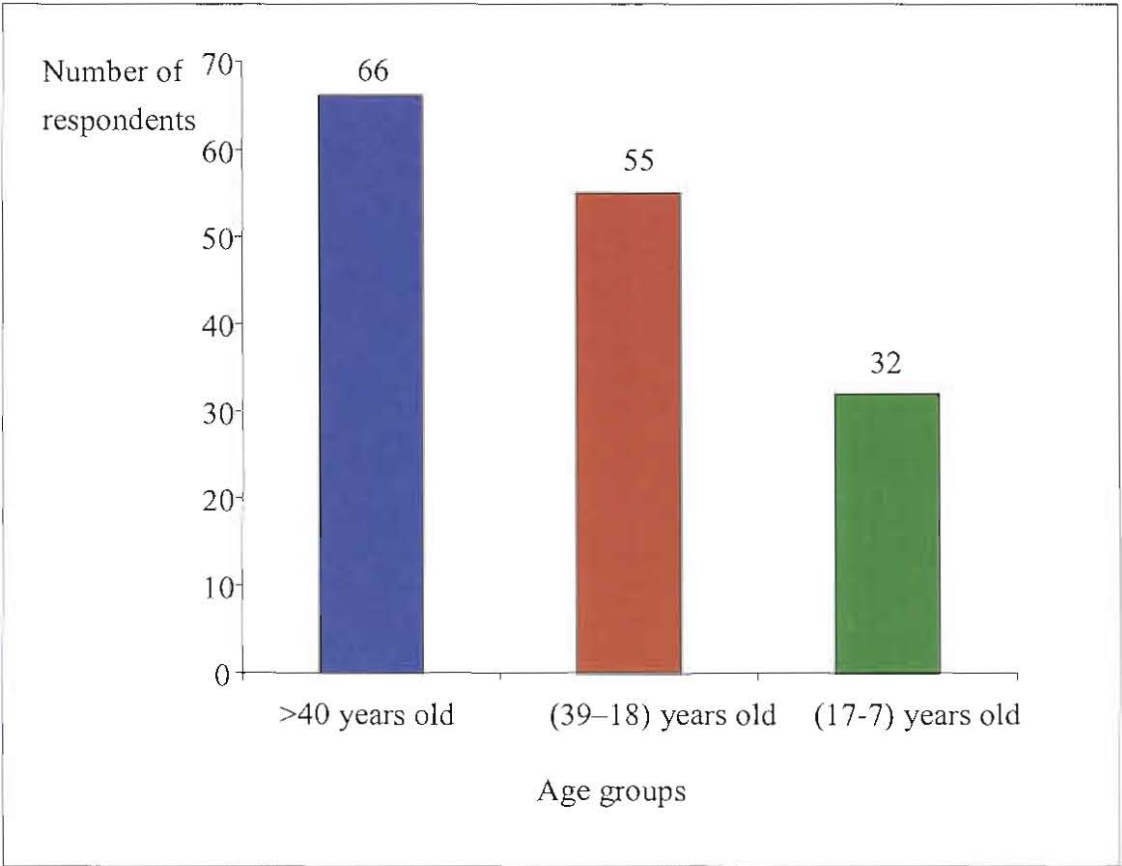


Figure 4: Entomophagy among the three age groups of the Bidayuh community

Generally, entomophagy in the four study areas is higher among males than females, with the exception of Padawan area, where the number between males and females is almost equal (Figure 5). However, Kruskal-Wallis Test show the difference in entomophagy between gender is not significant. Thus, null hypothesis 3 is rejected ( $p < 0.05$ ,  $df = 1$ ) (Appendix 5: Table 8)

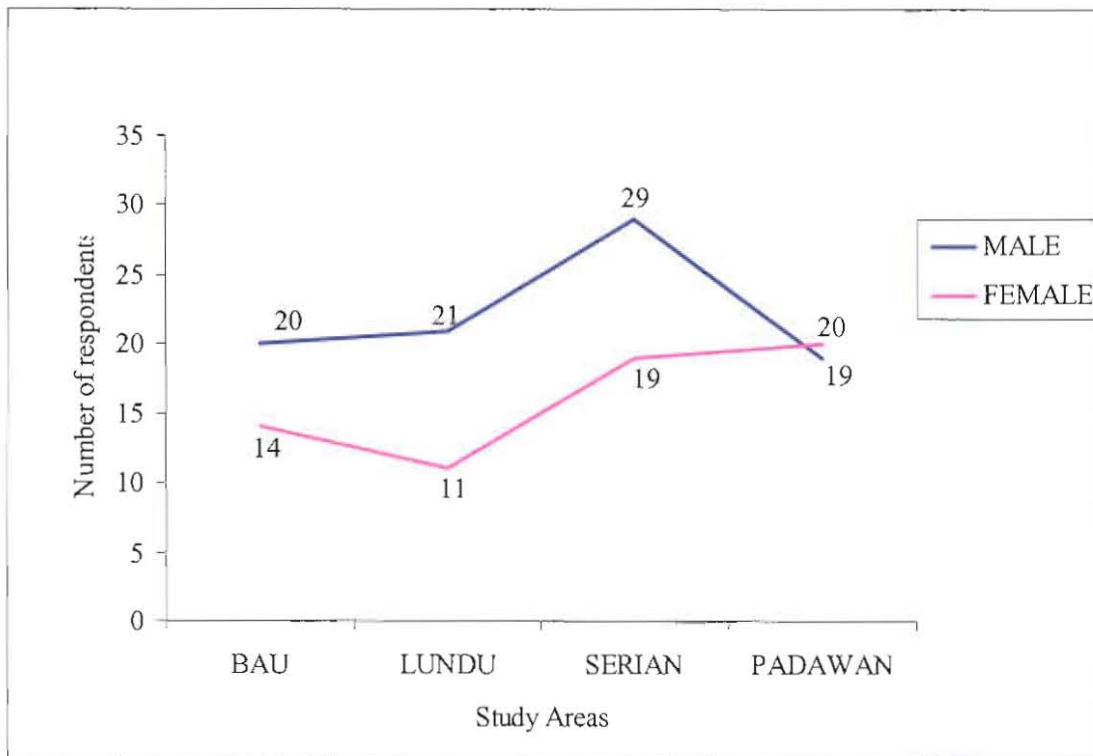


Figure 5: Entomophagy between sexes among the Bidayuh community in four study areas

## 5.0 Discussion

Surveys were conducted among the rural Bidayuh community by using designed questionnaires, personal interview as well as published reports. Four areas were selected for the surveys which are Bau, Serian, Lundu, and Padawan. From the survey, it was found that sixty four percent of the respondents used to take insect as one of their sources of food. Overall, 32% respondents in Serian area take insects as their food. Insect species commonly consumed are larvae of palm weevils or sago grubs, *Rhynchophorus ferrugineus* and *Rhynchophorus schach*, adults of grasshopper, *Patanga succincta*, and adults and eggs of red ant, *Oecophylla smaragdina*.



Most of the people who eat insect take them only occasionally as some insect are seasonally abundant. The abundance of adults palm weevil (Plate 3) is affected by seasonal changes, usually found in abundant at the end of the dry season to wet season (crescent). Generally, *Rhynchophorus* spp. seeks harborage in leaf axils of healthy palms (Weissling & Giblin-Davis, 1993) and moist fermenting garbage (Chittenden, 1902). *R. ferrugineus* is known as Asiatic Palm Weevil and is found in the decaying coconut palm while *R. schach* is known as Red Stripe Weevil and is found in the decaying oil palm and sago trees.

Palm trees are felled and cut into several small sections and open up the upper part of the trunk then covered the entire trunk with palm leaves before leaving it for three to four months to produce the larvae of weevils. The larvae bore into the palms and after several instars, they developed into adults in about two months (Giblin-Davis and Howard, 1989; Watananpongsiri, 1966; Napompeth, 1972). According to Nayar *et al.* generally, a female palm weevil could lay as many as 276 eggs which hatch in 2 – 5 days and grow into yellowish grub with a red head and becomes full grown in 36-78 days (Plate 1 & Plate 4). They pupate inside the trunk in fitrous cocoon (Plate 2) before emerging as adults (Plate 3).



<http://www3.ocn.ne.jp/~nanchiku/Insect-k-1.htm>

Plate 1

Sago grub or larvae of coconut palm weevil, *Rynchophorus ferrugineus*



<http://www3.ocn.ne.jp/~nanchiku/Insect-k-1.htm>

Plate 2

Pupa of palm weevils (cocoon), *Rynchophorus ferrugineus*



<http://www3.ocn.ne.jp/~nanchiku/Insect-k-1.htm>

Plate 3

Palm weevil, *Rynchophorus ferrugineus*



<http://pejalai.blogsome.com/2005/04/30/sago-grubs/>

Plate 4

Sago grubs or larvae of oil palm weevil, *Rynchophorus schach*

The sago grubs are consumed as food by the Bidayuh community because of its delicious and creamy taste. Most respondents think that the pupae of the weevils, *R. ferrugineus* and *R. schach* are the creamiest and the most delicious. They are prepared in many different styles such as roasted, boiled and fried and some people eat them raw. Sago grubs are regularly sold in the market. Additionally, Bidayuh people also

used sago grub as medicinal cures to treat rashes on the babies' mouth by applying the oil extracted from them.



The adults of grasshopper or locust, *Patanga succincta* (Order Orthoptera: Family Acrididae) also known as Bombay Locust, is one of the common edible insect species among the Bidayuh community.

Plate 5  
Adult of grasshopper (locust), *Patanga succincta*

The locusts, *P. succincta*, are found in abundance during harvesting season and they attack and destroy paddy (*Oryza sativa*) fields. According to Nayar *et al.* (1976) *P. succincta* and other locust species were known to be very destructive to crops and vegetation. Different with sago grub, locusts were taken only for family consumption and not for sell. The Bidayuh community picked the adult locusts, *P. succincta* from paddy fields early in the morning and late in the evening when the locusts are less active during that time. This makes it easier for them to collect the locusts. Bidayuh people ate locusts because they like their taste and prepared them by deep frying to make them crunchy and roasted.